Claims

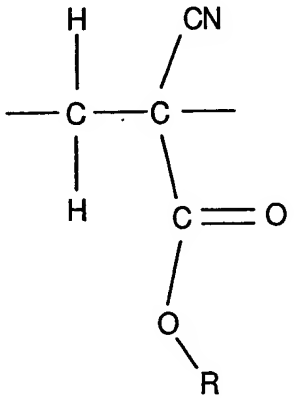
What is claimed is:

1. A resist composition comprising (a) an imaging polymer, and (b) a radiation sensitive acid generator, said imaging polymer comprising cyano-modified acrylic monomer units comprising an acrylic moiety with a cyano group pendant therefrom.

2. The composition of claim 1 wherein said imaging polymer contains cyclic olefin monomeric units in a backbone portion of said polymer, and/or (ii) alicyclic moieties as bulky end groups pendant to said cyano-modified acrylic monomer units.

3. The composition of claim 1 wherein said acrylic moiety is selected from the group consisting of acrylic acids and acrylates.

4. The composition of claim 1 wherein said 2-cyano acrylic monomer has a structure:



(I)

where R is H or COO-R is an ester group.

5. The composition of claim 4 wherein R contains at least one moiety selected from the group consisting of (a) an acid-labile moiety which inhibits solubility of said composition in aqueous alkaline solutions, (b) a polar moiety which promotes the solubility of said composition in aqueous alkaline solutions, and (c) a non-acid-labile, non-polar moiety.

6. The composition of claim 5 wherein R comprises an acid-labile moiety selected from the group consisting of tertiary alkyl (or cycloalkyl) esters, ketals, and acetals.

7. The composition of claim 6 wherein said acid-labile moiety is an ester form of an alkyl selected from the group consisting of t-butyl, methyl cyclopentyl, methyl cyclohexyl, and methyl adamantyl.

8. The composition of claim 5 wherein R comprises a polar moiety selected from the group consisting of carboxylic acids, lactones, amides, imides, sulfonamides, and fluoroalcohols such as $-CH(CF_3)OH$ and $-C(CF_3)_2OH$.

9. The composition of claim 5 wherein R comprises a non-polar, non-acid labile moiety selected from the group consisting of primary and secondary linear, branched and cyclic alkyls, and aryls.

10. The composition of claim 9 wherein said alkyls and aryls contain 1-12 carbon atoms.

11. The composition of claim 1 wherein said imaging polymer further comprises having at least one monomeric unit selected from the group consisting of (a) cyclic olefin monomeric units containing acid labile moieties which inhibit the solubility of the resist in aqueous alkaline solutions, (b) cyclic

olefin monomeric units containing polar moieties which promote solubility of said resist in aqueous alkaline solutions, (c) cyclic olefin monomeric units containing pendant lactone moieties, (d) cyclic olefin monomeric units containing no pendant moieties or pendant moieties which are non-polar and non-acid labile, (e) non-cyclic olefin monomeric units capable of undergoing free-radical copolymerization with said cyano-modified acrylic monomeric units, and (f) other monomeric units that are compatible with the function of the polymer as component of the resist.

12. The composition of claim 11 wherein said imaging polymer comprises (a) cyclic olefin monomeric units containing acid labile moieties which inhibit the solubility of the resist in aqueous alkaline solutions.

13. The composition of claim 11 wherein said imaging polymer comprises (b) cyclic olefin monomeric units containing polar moieties which promote solubility of said resist in aqueous alkaline solutions.

14. The composition of claim 11 wherein said imaging polymer comprises (c) cyclic olefin monomeric units containing pendant lactone moieties.

15. The composition of claim 1 wherein said imaging polymer contains at least about 20 mole % of cyano-modified acrylic monomeric units.

16. The composition of claim 1 wherein said resist composition contains at least about 0.5 wt.% of said radiation sensitive acid generator based on the weight of said imaging polymer.

17. A method of forming a patterned material structure on a substrate, said material being selected from the group consisting of semiconductors, ceramics and metals, said method comprising:

(A) providing a substrate with a layer of said material,

(B) applying a resist composition to said substrate to form a resist layer on said substrate, said resist composition comprising (a) an imaging polymer, and (b) a radiation sensitive acid generator, said imaging polymer comprising cyano-modified acrylic monomer units comprising an acrylic moiety with a cyano group pendant therefrom;

(C) patternwise exposing said substrate to radiation whereby acid is generated by said acid generator in exposed regions of said resist layer by said radiation,

(D) contacting said substrate with an aqueous alkaline developer solution, whereby said exposed regions of said resist layer are selectively dissolved by said developer solution to reveal a patterned resist structure, and

(E) transferring resist structure pattern to said material layer, by etching into said material layer through spaces in said resist structure pattern.

18. The method of claim 17 wherein said material is metal.

19. The method of claim 17 wherein said etching comprises reactive ion etching.

20. The method of claim 17 wherein at least one intermediate layer is provided between said material layer and said resist layer, and step (E) comprises etching through said intermediate layer.

21. The method of claim 17 wherein said radiation has a wavelength of about 193 nm.

22. The method of claim 17 wherein said substrate is baked between steps (C) and (D).

23. The method of claim 17 wherein said imaging polymer contains cyclic olefin monomeric units in a backbone portion of said polymer, and/or (ii) alicyclic moieties as bulky end groups.